



DP Advanced Integrated MultiWaste System

DP CleanTech
Creating value from waste

Introduction

The environmental impact of unmanaged waste around the world is affecting every aspect of society. The World Bank estimates that 2.01 billion tonnes of municipal solid waste were generated in 2016, and this number is expected to grow to 3.40 billion tonnes by 2050, much of this from lower income countries.

The waste management situation varies by country, but in general as incomes rise, so does the waste generated. In lower income countries, over 50% of waste is organic which contains water. The recyclable components of waste tend to rise as personal incomes increase. The sustainable management of waste has a significant financial cost, and it is a challenge for many rapidly developing countries and societies to reconcile the cost of proper waste management with other imperatives.



Meeting the Challenge

DP believes that waste management solutions do not need to be highly complex or costly. Reliable, proven solutions designed around the scale and specific needs of the local community can be efficient, sustainable and economically affordable.

DP owns multiple, well proven technologies that address each stage of the modern waste management process. For MSW, DP has individual technologies for mechanical pre-treatment; organic treatment with anaerobic digestion and thermal treatment for energy recovery.

To address the issues of complexity, cost and changing waste composition, we have designed an innovative solution that integrates these technologies into a highly flexible and efficient unit for waste management. DP's Advanced Integrated MultiWaste System (AIMS) has significant advantages in power output, operational costs and lower capital investment over traditional solutions.

Advanced Integrated Multiwaste System (AIMS)

Reusing and Recovering Energy From MSW



Key features

- Separation of organic waste from recyclables
- Recycling to meet market demand for recycled materials
- Production of high quality RDF
- Biological treatment of the organic fraction using Anaerobic Digestion
- Biogas production for power utilisation, or transfer to Bio-methane and liquid Carbon Dioxide (food grade)
- Potential fertiliser production or thermal drying of digestate to RDF
- Thermal treatment of RDF for conversion to energy



Benefits compared to a typical stoker-type MSW plant

30% higher power output

40% lower capital investment

20% lower demand for additives for the flue gas treatment

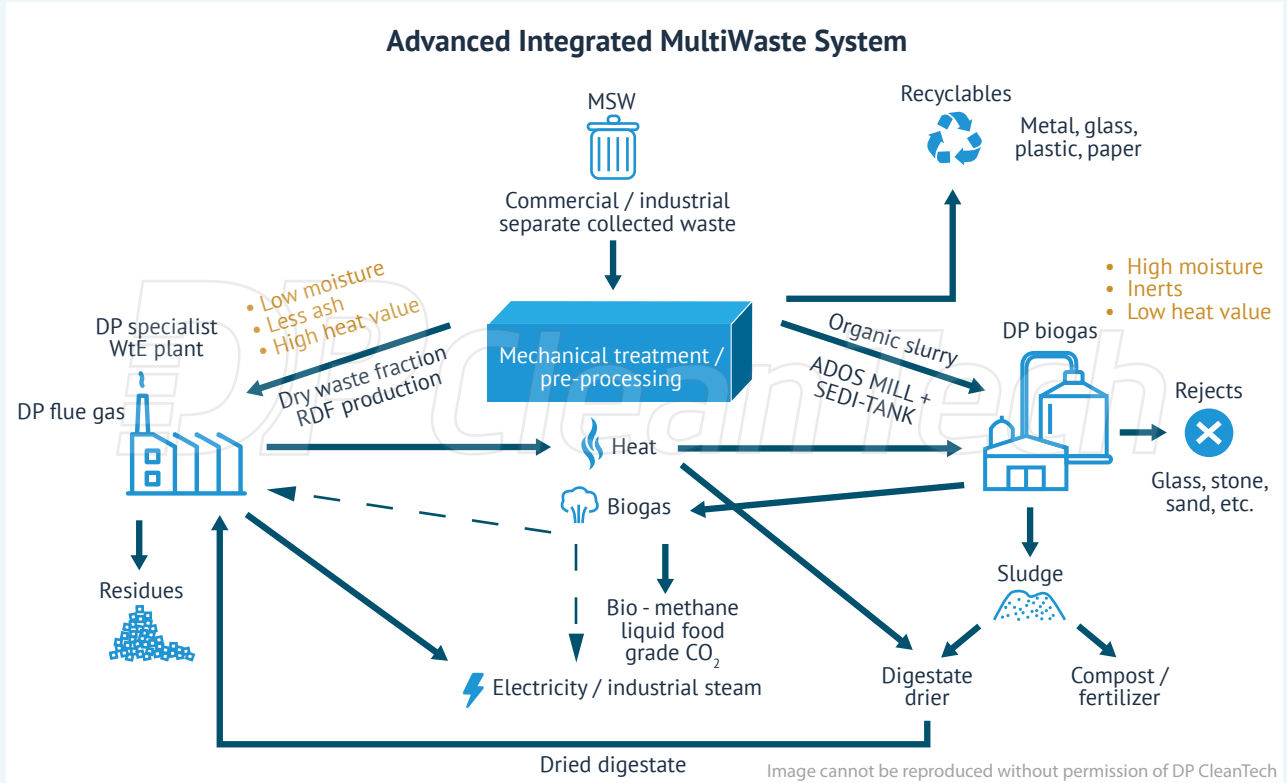
Significantly **greater flexibility** for future changes in waste streams and waste types

Integration of separate collection of **different waste types** possible

On site production of recycling products **easily adjusted** to market demands

AIMS Component Technologies

All technologies used within the AIMS system are well proven and have been operational for many years. The integration of these proven solutions leverages DP's core engineering skills and experience to deliver a unique, flexible solution that is particularly suited to the economic and practical challenges faced by emerging markets.



Mechanical Treatment Plant (MRF)

The MRF plant uses a manual or automatic sorting system to separate the recyclables, RDF and organics. The recyclables can be offered in the market or used to produce a high-quality Refuse Derived Fuel (RDF) for thermal treatment in the WtE plant. The remaining organic fraction is a degradable organic substance with the water content of the MSW. The proper mechanical separation (splitting) of waste ensures that downstream waste processing technologies are deployed to maximum benefit.



Organic Treatment Plant (ADOS)

Treats the organic substance using DP's ADOS anaerobic digestion technology to produce biogas for use in gas engines to produce 'green power'; or to transfer the biogas in bio-methane with a liquid carbon dioxide component of food grade quality.

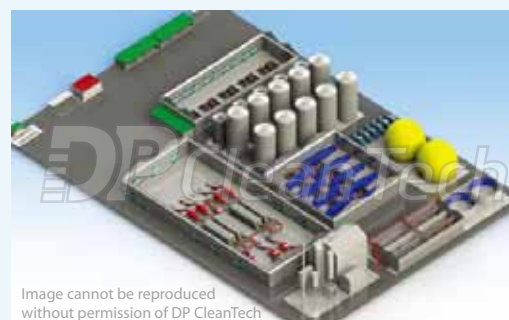
If the digestate is not required for compost or fertiliser, it will be dried for use as fuel in the WtE plant.



DP Specialist RDF (WtE) Thermal Combustion Plant

The plant consists of DP's highly efficient Water Cooled Vibrating Grate and High Temperature High Pressure Specialist boiler solution that has been used in almost 100 waste to energy plants to date. This technology can use prepared fuel from both the mechanical treatment and the ADOS plant. An efficient flue gas cleaning system guarantees emissions levels that more than meet international standards. The WtE plant produces high pressure/temperature steam which is transferred to electric power at a steam turbine.

The AIMS system is the most efficient MSW treatment configuration available, with proven individual technologies.



AIMS solution for 1,500 tpd MSW

The AIMS Process

MRF Mechanical Treatment

Incoming MSW is separated using bag breakers, screens, ballistic sorters or air separators, optical sorting systems or hand sorting areas, metal separators. The size and flexibility of the system is designed in accordance with the waste composition and quantity.

Once separated, the inorganic fractions are used for recyclable materials or production of RDF (Refuse Derived Fuel).

RDF characteristics:

- Low water and ash content
- High heat value
- Size and quality controlled
- Elimination of stones, metals, glass and similar "heavy" particles

ADOS Anaerobic Digestion Plant

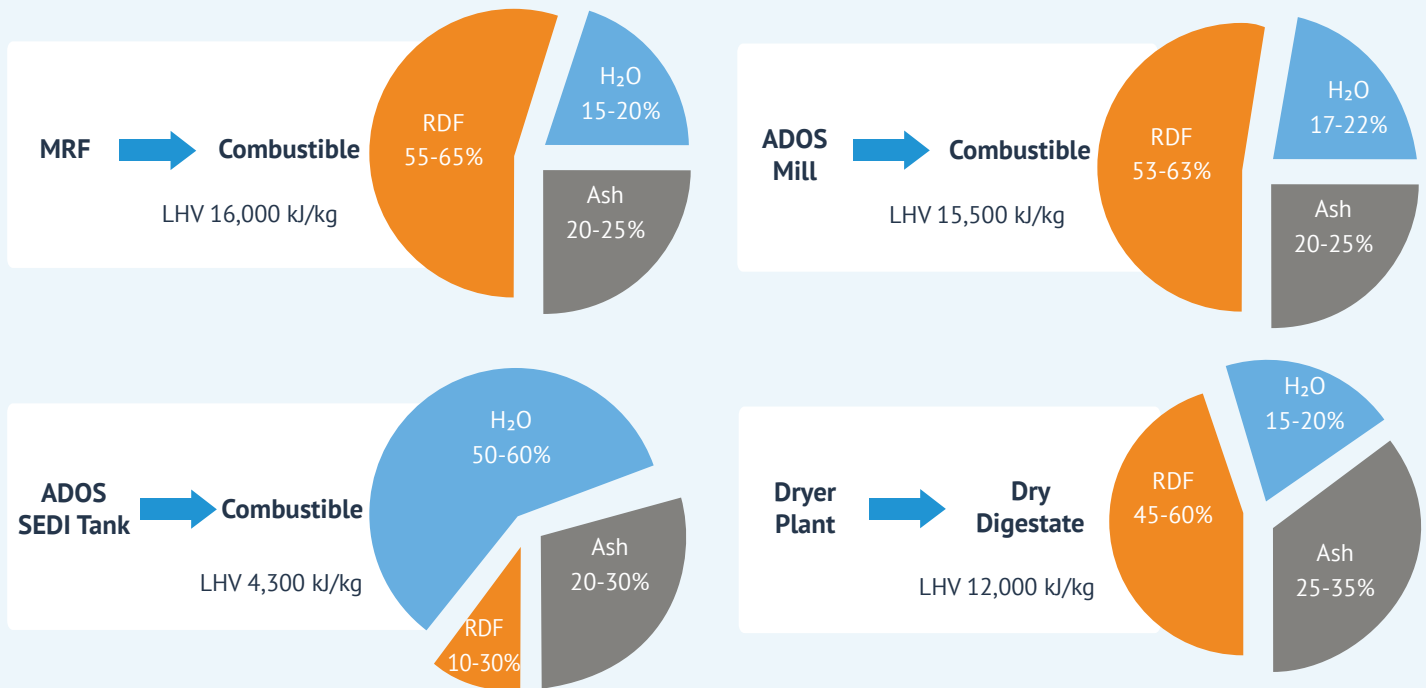
The ADOS Mill and ADOS SEDI technology produces a clean organic slurry and biogas. The biogas powers highly efficient gas engines; and waste heat from the engines is used internally for the AD process and for the dryer plant. The ADOS digesters are easily maintained during operation, eliminating the need for maintenance shutdowns.

Unwanted digestate from the AD process is mechanically dewatered by centrifuges and dried using thermal belt dryers, using waste heat from the gas engines and condensation of the WtE plant steam turbine.

The RDF (WtE) Plant

Typical incoming fuels from the MRF, ADOS and the Dryer plant are stored in a fully automated bunker storage system.

AIMS Component	Fuel Output	Water Content	Ash Content	LHV
MRF	RDF	15-20%	20-25%	16,000 kJ/kg
ADOS Mill	RDF	17-22%	20-25%	15,500 kJ/kg
ADOS SEDI Tank	RDF	50-60%	20-30%	4,300 kJ/kg
Dryer Plant	Dry Digestate	15-20%	25-35%	12,000 kJ/kg



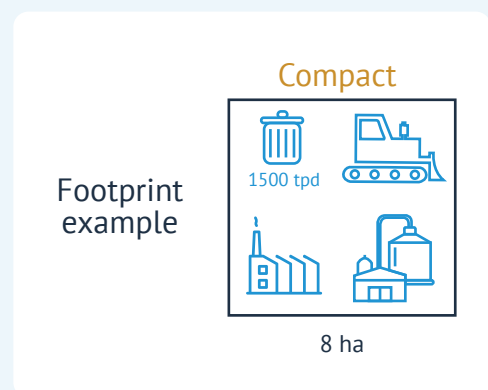
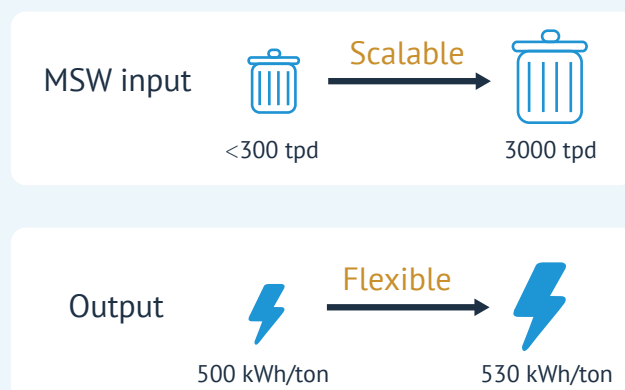
The Water Cooled Vibrating Grate and boiler allows excellent flexibility for fuel feeding and changing the firing load. The flue gas cleaning fulfils all legal requirements. The heat recovery with a steam boiler and a turbine island allows the production of power.

Technical parameters:

Power production (to grid after self-consumption)	500 to 530 kWh/ton MSW
Heavy fraction/Sediments from ADOS to landfill	8 - 10 M%
Bottom Ash to landfill	5 - 10 M%
Fly ash to landfill	2 - 4 M%
Condensate/Water	35 - 45 M% depending on the MSW

The AIMS Solution Represents a New Approach to Managing Waste

As a 'one stop solution' it allows developers and communities to deal simultaneously and efficiently with different fractions of MSW, whilst generating power and other products. It also offers scalability and a flexibility that provides assurance for the future.



Case Studies and References

Fairway Karadiyana

Fairway Waste Management (Pvt) Ltd, a Public Private Partnership with the Sri Lankan Government is currently developing the 12MWe Karadiyana Waste Processing Project in Colombo District, Western Province as an integrated processing facility. It is the first such project in Sri Lanka and is a landmark project to address a rapidly growing municipal waste problem in the capital.



DP CleanTech is supplying and commissioning its well-proven waste combustion boiler and grate solution; as well as the anaerobic digestion plant, plant automation and flue gas cleaning systems. After internal consumption, the thermal plant can produce 79,000,000 kWh/year and the AD plant 16,000,000 kWh/year (gross) . Per annum, it will supply the grid with 72,000,000 kWh/year from the thermal plant and 13,000,000 kWh/year from the AD plant. DP is supplying its proprietary plant automation system to ensure that the plant is optimised 24/7; and is also providing the flue gas cleaning and emissions control system to manage emissions to EU2010 standards.

This pioneering project deploys DP's high performing combustion and biological process technologies to treat organic and inorganic MSW; thereby ensuring that the whole waste stream is being utilised in the recovery of energy and nutrients. It will be the first waste to energy facility in Sri Lanka to meet all international environmental and sustainability standards. In processing up to 500 MT (metric tons)/day of fresh municipal solid waste (MSW), the facility will reduce landfill waste from the catchment area by up to 90% and will immediately improve the environment for local communities as well as providing electricity for up to 40,000 homes.



Contact Us

DP has 7 offices around the world in 6 countries – China, Denmark, Poland, Thailand, UAE and UK.

To ensure that we can address your needs appropriately, please email info@dpcleantech.com for enquiries or further information.

About DP CleanTech

- ✓ Founded in 2004, DP CleanTech Group designs, engineers, manufactures and commissions complete solutions for managing waste materials; and for conversion of waste materials into clean energy.
- ✓ DP's core technologies originate in Europe and are behind over 300 biomass and waste-related projects around the world.
- ✓ DP has a broad portfolio of innovative Waste-to-Energy and environmental management technologies with which to lead the advancement of renewable energy and environmental protection.
- ✓ DP technology was behind the first biomass power plant in both Denmark and the first commercial power plant in China.
- ✓ DP has facilities and multiple references across Europe and Asia; and has projects under development in Africa and South America.



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